illumination and a video camera viewing the back focal plane of the microscope objective lens. The path-length difference between the object and reference paths in the interference microscope is varied while a sequence of optical images are captured by the video camera.

Each location on the image is processed as a separate channel and is transformed by Fourier analysis to provide the specular reflection coefficient terms as a function of angle and wavelength. This provides a spectroscopic signature useful in inverse signature or other types of spectroscopic analysis. Further, the current invention also provides phase and polarization data as a function of wavelength and angle.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is an illustration of a Mireau interference microscope adapted in accordance with one embodiment of the present invention.

Figure 2 is a more detailed illustration of the optical reference and object paths of the Mireau interference microscope shown in Figure 1.

Figure 3a is a diagram illustrating specular and non-specular reflection in the optical object path of the Mireau interference microscope shown in Figure 1.

Figure 3b is a diagram illustrating specular in the optical object path and the optical reference path of the Mireau interference microscope shown in Figure 1.

Figure 4 is an illustration of the image of the back focal plane 50 as captured by video camera 110.

Figure 5 is an illustration of the scattering angles relative to the object plane 70 showing the relationship to the image on the video camera image 400 illustrated in Figure 4.

Figure 6a is an illustration of the intensity data from a typical channel as a function of path-length-difference.

Figure 6b is an illustration real part of the Fourier transform of the intensity data from of Figure 6a.

Figure 6c is an illustration imaginary part of the Fourier transform of the intensity data from of Figure 6a.

Figure 7 illustrates a Linnik interference microscope adapted in accordance with the present invention.

Figure 8 is an illustration of the sequence of steps used in inverse scattering in accordance with the present invention.